

Effective methods to propagate plants from cuttings, by adventitious root formation, grafting & stenting, layering, and improved transplanting using Hortus and Rhizopon plant rooting hormones.

Includes a case study of rose propagation

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CASE STUDY FOR ROSES

Growers of roses and other plants always have several varieties that are favorites. From these favorites there may be some which are desirable to propagate to make new plants. This is especially true when older varieties are no longer commercially available.

Propagation of roses by cuttings:

Propagating roses (and other plants) by rooting softwood cuttings is a simple way to obtain more plants. Some varieties are usually self-rooted. Other varieties have the upper portion budded or grafted onto a root stock; these root stocks are usually propagated from cuttings. "Old Garden Roses", shrub roses and miniature roses may be grown on their own roots. Modern hybrid teas and floribundas are less predictable.

Many rose varieties cuttings are best taken from young stems of the current seasons growth. When taking cuttings from "non-stop" varieties select stems on which the flowers petals have just fallen. For "annually flowering" varieties take cuttings in the late Spring after the flowers have faded.

Rooting rootstock for roses used for budding and grafting:

Some roses are propagated by taking a cutting or a bud from a selected variety (scion) and attach it to a selected rootstock (stock). If you intend to bud or graft plants the rootstock plants are produced from cuttings. First root the rootstocks from cuttings then perform the budding or grafting operations. Some growers graft and root the root stocks at the same time; this technique is called stenting.

Rooting rootstock for many plants propagated by budding and grafting:

<http://hortus.com/cummins.htm>

[Grafting success may be improved using Hortus IBA Water Soluble Salts or Rhizopon AA Water Soluble Tablet rooting solutions \(see more information to improve grafting unions\):](#)

Success of a graft union depends on the establishment of a callus bridge between the cut surfaces of scion and stock, and the subsequent establishment of a functioning vascular cylinder connecting scion and stock. Initial callus formation appears to develop about equally on the cut surfaces of both partners, arising not from the cambial layers but from parenchyma cells, mostly in the wood just inside the cambium. Soon after scion and stock calluses have merged, callus cells just below the cambial cells of the scion begin to divide in the same plane as the cambium. Waves of cell division proceed from the top down, suggesting that a regulatory stimulus moves to the cut surface from the growing-shoot tip. Callus parenchyma cells inside the new cambium cylinder re-differentiate into functioning xylem cells. Last of all, the new cambium begins producing phloem cells.

Taking the Cuttings:

Take roses cuttings with some leaves attached. The leaves provide sugars from photo-synthesis. When taking winter cuttings, November through January, some rose varieties will root without leaves. Depending upon the variety select cuttings with five leaves. The cuttings should be taken in the cool time of the day. Be careful not to let the cuttings dehydrate; place them in a poly bag, seal and place in a refrigerated area at 38-40F (3C). Allow a day in a refrigerator to seal the wound.

<http://hortus.com/takecut.htm>

Type of Cutting:

CUTTINGS TAKEN FROM ALL TYPES OF PLANTS

Before you take any cuttings be sure to choose a healthy, disease-free stem. The type of cut taken can vary. You can leave a bud and leaf node at the base. Or, leave just a smooth area of stem internode. For some varieties take the cuttings with a node at the base; the node area may root more easily. Depending upon the age of the cutting, for an older cutting wound the base of the cutting by making 1/2 to 1 inch vertical slits with a knife.

Rooting Hormone Application Methods to Select:



<http://hortus.com/cuttype.htm>

METHODS USED TO PROPAGATE PLANTS FROM CUTTINGS

Basal Methods using solutions made with Hortus IBA Water Soluble Salts and Rhizopon AA Water Soluble Tablets:

BASAL QUICK DIP METHOD

First treat the cuttings then plant them. Immerse the basal end of cuttings approximately one inch in the solution for a few seconds. Plant the cuttings immediately.

Use the lowest possible concentration to achieve the desired results. Excess concentration may result in reduced numbers of roots formed, phyto toxicity, shock, excessive callus, and rooting inequality.

Rates: using Hortus IBA Water Soluble Salts and Rhizopon AA Water Soluble Tablets by plant variety see the [Rates \(Basal Quick Dip\) by Plant Variety and Type](#)

<http://hortus.com/IBAmethod.htm>

http://hortus.com/Rates_BasalQuickDip.htm



BASAL LONG SOAK METHOD

Use the Basal Long Soak Method on cuttings which are more difficult to root or are more woody. A long soak of the cuttings in a low concentration solution causes the plant tissues to absorb the active ingredients. Use this method on plants which may be sensitive to high concentration used in the Quick Dip Method. Immerse the basal end of cuttings approximately one inch in the solution for 12-25 hours nominal. Plant the cuttings immediately or cuttings can be stored in cold storage.

Rates if you use Rhizopon AA Water Soluble Tablets: 1-2 tablets per liter of water.

Rates if you use Hortus IBA Water Soluble Salts: 1/4 to 1/2 gram per liter of water.

Rates: using Hortus IBA Water Soluble Salts and Rhizopon AA Water Soluble Tablets by plant variety see the [Rates \(Basal Long Soak\) by Plant Variety and Type](#)



http://hortus.com/Rates_BasalLongSoak.htm

Basal Methods using Rhizopon AA Dry Dip rooting powders:

<http://hortus.com/drydip.htm>

DRY DIP METHOD



Dip the basal end of the cuttings 3/4 to 1 inch into the [Rhizopon AA dry powder rooting hormones](#), one by one or in small bundles. Make sure that the powder is evenly distributed in a thin even layer (1/32 to 1/16 inch) over the whole base of the cutting. Too much powder on the cuttings might result in excessive rooting where there is surplus powder. Root formation can be expected all over the part of the cutting covered with the powder. Avoid contact between the powder and foliage and other over ground parts of the stem since it may cause phyto toxicity. Tap off the excess powder. Plant the cuttings immediately in moist media. After treating cuttings take care of them.

Rates for roses using Rhizopon AA dry powder rooting hormones, usually
[Rhizopon AA #1 or Rhizopon AA #2 \(best\) early in the season](#)
[Rhizopon AA #3 \(for harder to root cuttings\) later in the season.](#)

Rates: using Rhizopon AA dry dip rooting hormones by plant variety see the [Rates \(Dry Dip\) by Plant Variety and Type](#)

http://hortus.com/Rates_DryDip.htm

Foliar Methods using solutions made with Hortus IBA Water Soluble Salts and Rhizopon AA Water Soluble Tablets:

TOTAL IMMERSE METHOD

used at the same rates as the Spray Drip Down Method



First totally immerse the cuttings in the fresh [Rhizopon AA Water Soluble Tablet](#) or [Hortus IBA Water Soluble Salts](#) solution for a few seconds then plant them. You can use a basket to dip the cuttings in a tub. Prevent bruising by not placing too many cuttings in the solution at once. Allow time for the solution to dry on the cuttings before watering, misting or covering. The temperature of the solution should be at least equal to the cutting temperature. A cold solution temperature causes the stomata of the cuttings close; the amount of active ingredients absorbed is reduced. <http://hortus.com/IBAmethod.htm>

Rates for roses if you use Rhizopon AA Water Soluble Tablets: 3-5 tablets per liter of water.

Rates for roses if you use Hortus IBA Water Soluble Salts: 3/4 to 1-1/4 gram per liter of water.

Rates: using Hortus IBA Water Soluble Salts and Rhizopon AA Water Soluble Tablets by plant variety see the [Rates \(Spray Drip Down and Total Immerse\) for Plant Variety and Type](#)

There is a major benefit to use this method. The bud eyes keep dormant until the root is developed thereby achieving a stronger plant.

http://hortus.com/Rates_Spray-Immerse.htm

SPRAY DRIP DOWN ® METHOD

used at the same rates as the Total Immerse Method



First plant the cuttings. Spray the solution evenly over the cuttings until drops go down to the media.

Rates if you use Rhizopon AA Water Soluble Tablets: 3-5 tablets per liter of water.

Rates if you use Hortus IBA Water Soluble Salts: 3/4 to 1-1/4 gram per liter of water.

Rates: using Hortus IBA Water Soluble Salts and Rhizopon AA Water Soluble Tablets by plant variety see the [Rates \(Spray Drip Down and Total Immerse\) for Plant Variety and Type](#)

http://hortus.com/Rates_Spray-Immerse.htm

Planting and Taking Care of the Cuttings:

Hints for taking care of the Cuttings

Fill the pots firmly with a sterile potting mix which is moist not soggy. Several cuttings can be planted in the same pot. Treat the cuttings with rooting hormones using the Rhizopon AA dry powder rooting hormone Dry Dip Method or

a [Rhizopon AA Water Soluble Tablet](#) or [Hortus IBA Water Soluble Salts](#) (to make fresh solutions) Solution method. Place the cutting in the hole and firm the soil very tightly around it.

<http://hortus.com/IBAmethod.htm>

Control the Humidity



To prevent the cuttings from dehydrating through the leaves and stems the cuttings are often propagated under mist systems in controlled greenhouses or tunnels, in cutting trays covered with plastic.

Maintain adequate moisture in the soil and air humidity. Commercial growers usually use mist system to prevent wilting. A fine mist of water is sprayed over the cuttings for a few seconds every few minutes. Another method is to stick the cuttings in pots or trays then cover and seal the pot with clear plastic; a poly bag works well when covering a small pot. When available use a misting system.

"Pop-Bottle Method"



Construct "greenhouses" for the cuttings using empty 1 or 2 liter soft drink bottles small pots or cups which are larger in the top than the bottom of the soda bottle.

For old style soda bottles: use a knife to cut off the bottom of the bottle where the solid-colored section is joined to the clear section. For new style bottles: cut off the bottom. Keep the bottle cap. Use pots which fit into the bottle bottom.

The top of the bottle should just fit snugly inside the pot rim. If you have the old style bottle bottoms, use them as a pot holder.

Place the top from the soda bottle over the cutting and press it gently into the soil. Make sure that there are no gaps through which evaporation could occur. Put the cap on the bottle, but do not tighten.

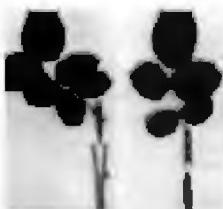
After a few hours check the bottles to make sure there is some moisture condensed on the inside of each. If not, your soil may not have been moist enough and a small amount of additional water should be added.

Place the bottles in a bright light but not in direct sunlight as below. In the hot Summer keep in bright shade to prevent overheating the tender plants.

Stenting:

Graft shown with scion top and rootstock bottom

<http://hortus.com/stenting.htm>



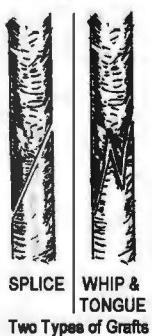
Stenting is a method for the quick propagation of roses. Cutting and grafting is performed in one action. In Dutch the word "stenting" means "to stem". It is a combination "stekken" meaning "to strike a cutting" and "enter" meaning "to graft". The success of simultaneous cutting and grafting is cost effective.

In practice, the scion consists of the cultivar stem taken with one leaf and a dormant bud. The scion is grafted on a single internode of the non-rooted rootstock. Formation of the graft union and of adventitious roots on the rootstock occur simultaneously. The combined process takes three weeks.

See Video:

[Stenting of Roses in a Commercial Greenhouse](#)

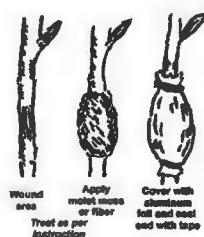
<http://hortus.com/stenting.htm>



SPLICE WHIP & TONGUE
Two Types of Grafts

Air Layering:

Air layering involves the wounding the stem of the plant while it is on the stock plant. Treat the stem then cover it. Roots form in the covered area. The tip of the stem sticking out of the covered area will continue to grow. It will soon become a new plant with its own roots. The roots form at the wound. After the roots form sever the stem from the stock plant.



Use Rhizopon AA dry powder rooting hormones to treat air layers. Apply using a clean soft brush using Rhizopon AA #2 or #3 dry powder rooting hormones. If using cocoa fibers make sure the processing salts have been removed. As an alternate you can use Rhizopon AA Water Soluble Tablets or Hortus IBA Water Soluble Salts. Soak the moss or cocoa fibers in 3-10 tablets per liter water. Wound the stem of the cane. Apply the fiber. Cover the fibers with aluminum foil to protect against drying out.

See: [Other Special Techniques](#)

<http://hortus.com/specotech.htm>

Improve Transplanting:

Root regeneration of rose plants is promoted by application of Rhizopon AA solutions. The active ingredients in Rhizopon AA Water Soluble Tablets applied to root segments increase the number of regenerated roots as well as root length.

A rose crop often starts with transplanting dormant material. Problems with survival and bush development may be due to bad root re-growth (root regeneration). A treatment that would decrease the time to new root initiation and increase the number of roots or the elongation rate of the roots should increase the chances of successful establishment and early productivity of rose plants. Re-growth of roots is generally known as root-regenerating potential (RRP) which is defined as the capacity of roots to elongate or initiate and elongate new lateral roots.

Growers use Rhizopon AA when transplanting rooted rose bushes to improve early flower yield. Roses, Inc. growers produce 80% of the rose flowers grown in the US. These growers follow the lead of their Dutch counterparts to increase flower yield by using Rhizopon AA. The following is excerpted from a technical report published in the Roses Inc. Bulletin (October 1992).



←The photograph on the left is an un-treated one year rose bush. On the right is a RhizoponAA Water Soluble Tablet treated one year rose bush. Notice that the treated bush has more fibrous growth and greater root mass. Traditionally American rose growers allowed one to two years of growth before transplanting rose bushes. Without special treatment a young rose transplant uses its energy to rebuild a root system instead of entire plant growth. Without a strong root system the plant has reduced ability to feed and receive water therefore subject to stress and possible mortality.

Dutch growers, for over fifty years, transplant half year old rose bushes. To improve root regeneration and increased first year flower yield when transplanting bare root rose bushes the roots are immersed in a solution containing Rhizopon AA Water Soluble Tablets dissolved in water. The roots are not cut back except for damaged or broken roots. Living roots contain stored carbohydrates.

Transplanting Technique:

The bare roots of the rose bushes are immersed for ten minutes in a solution containing three Rhizopon AA tablets per liter water or five minutes at five Rhizopon AA tablets per liter water or Hortus IBA Water Soluble Salts at 3/4 to 1 1/4 gram per liter of water. (The exact rate is not critical)

After treatment the rose bushes are planted immediately. At planting time the soil temperature should be above 60F and air temperature above 65F with relative humidity at 80%. Warm soil temperature is a major factor in utilization of the active ingredients.

<http://hortus.com/transplan.htm>

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